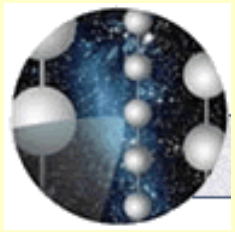
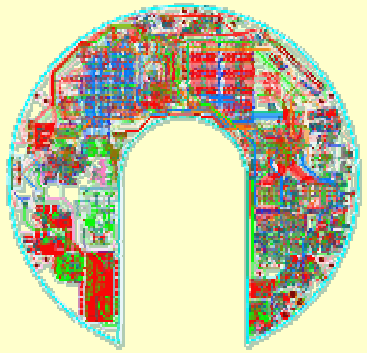


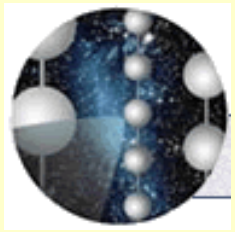


DOM Main PCB Testing

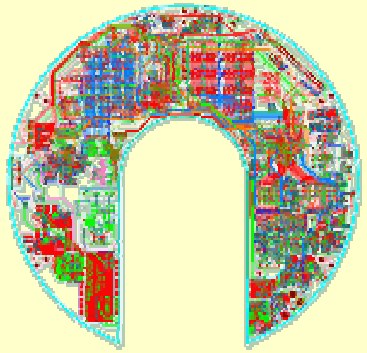
Gerald Przybylski

October 23, 2002

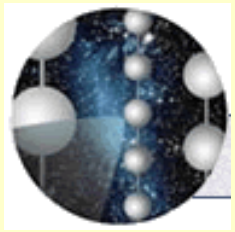
Lawrence Berkeley National Laboratory



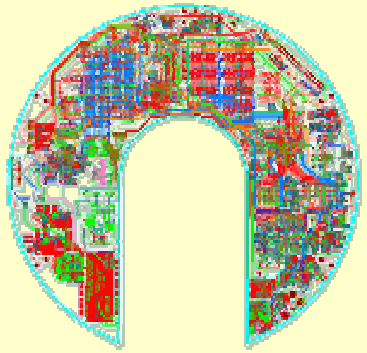
Subsystems



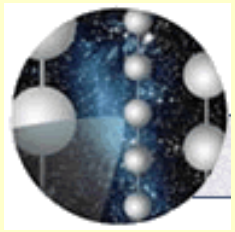
- Power supplies
- Communications front end
- DACs for ATWD config, etc.
- ADCs for Pressure and power monitoring
- Temperature monitor (digital)
- PMT Front End
- Test Pulser
- PMT HV ADC, DAC, and enable control
- Local Coincidence
- Serial number readout; Differentiation; Defaults



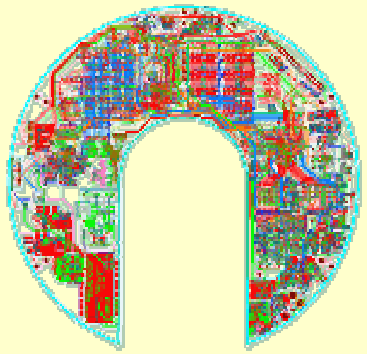
Basic Test



- Power supply shorts
  - to each other
  - to ground.
- Power supply voltages
  - test points provided
- 100V DC-DC Converter Input current
- Derived power supply currents



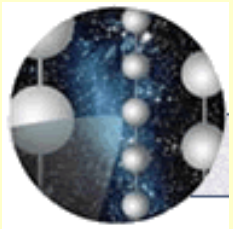
Configure for Testing

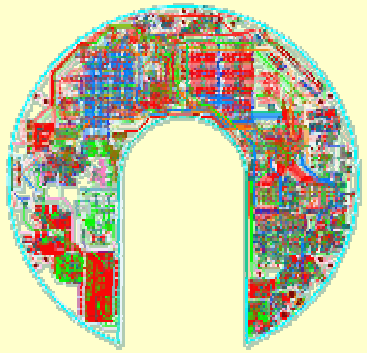


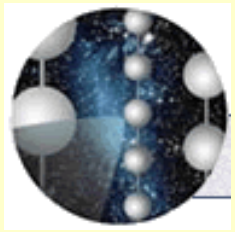
- Load PLD via JTAG
- Load CPU via JTAG
- Load Configuration Memory via JTAG
  - Boot file and basic FPGA configuration file
  - Basic System Test Program(s)
  - Software tools for hardware testing
- Load Flash via JTAG
  - Default Settings for DACs etc.
  - Identity (Given Name, Production Lot, etc.)
  - Test Application
  - Default FPGA Configuration File
- Talk to CPU via RS-232, and run subsystem tests

Basic System Test (Programs)

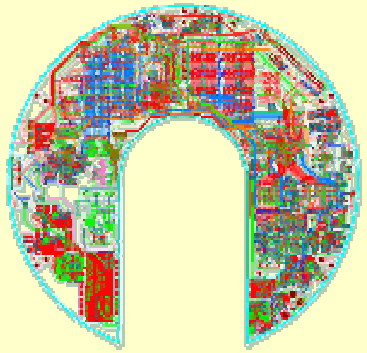
- Memory Test
- FPGA Download
- DAC Load
- ADC Readout (housekeeping)
- Local Coincidence Loop-back test
- Pulse and read FADC
- Pulse and read ATWD



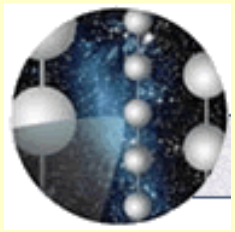




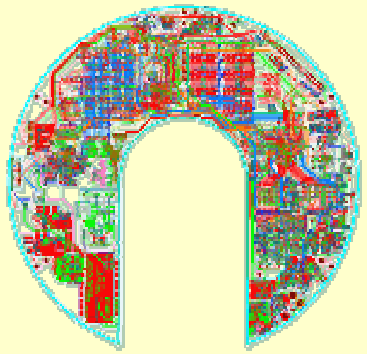
Line Tests



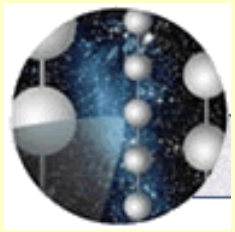
- Receive data over twisted pair
- Transmit data over twisted pair
- Time-stamp and Digitize Leading Edge



Test Resources & Troubleshooting Tools

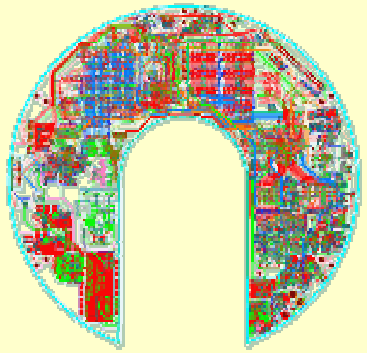


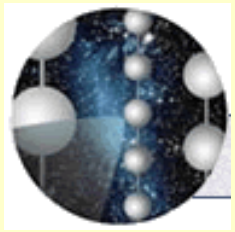
- Poke single FPGA or PLD register
- Peak single FPGA or PLD register
- Vector read of single FPGA address
- Vector read of range of FPGA addresses
- Wait for event (e.g. bit set/clear or interrupt)
- Set DAC, and PMT HV
- Read ADC, PMT HV, and Temperature



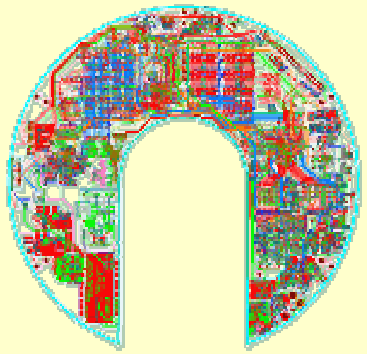
Additional Tools

- Store FPGA configuration(s) to flash file
- Load any FPGA configuration from flash
- Forth interpreter

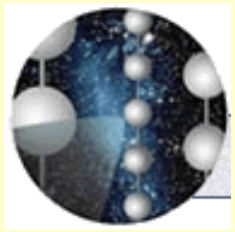




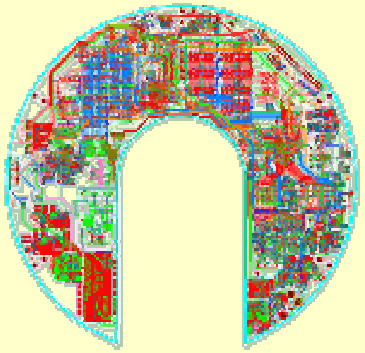
Commissioning Tools



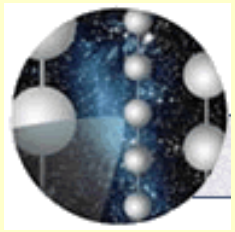
- Inquire the System Serial Number
- Assign A or B type (differentiation)
- Assign *Given Name*
- Assign Start-up Defaults
- Flash File System Management tools
- Inquire configuration
- Execute Self Test Application



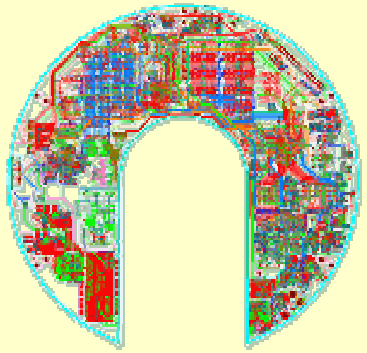
Higher Level Tests (1)



- ATWD Pedestal Pattern
- ATWD Span Calibration (gain)
- ATWD A and B Cross Calibration
- Synchronous Peak-to-Valley Ratio
- PMT Transit Time and Transit Time Spread
- Discriminator Threshold Sweep



Higher Level Tests (2)



- RAP Cable Length Measurement
- Crystal oscillator drift & fluctuations

The devil is in the details…